Hello! Welcome to Team 8’s webpage of the EDGSN 100 Section 003 class.

Our group is (from left to right):

Christopher Lynch cj5435@psu.edu
Ryan Rodin br65034@psu.edu
Robert Hill rds55334@psu.edu
Karl Jones pkl5002@psu.edu
Mohini Srivastava mrs5907@psu.edu

This cover page provides information about our projects that our team has worked on throughout the semester.

Project 1

Our first project involved the development of a new design for a solar fruit drying tray for Kenyan fruit farmers. This project was assigned to us by HESS. The website link can be accessed by clicking on the model of our solar fruit drying tray.

Project 2

Our second project involved the task of developing a way to increase sustainability of aluminum and aluminum-based products across campus. This project was assigned to us by ALCOA. Our proposal involves a rebate program implemented across Penn State’s campus for all aluminum cans. To recycle them, a SolidWorks prototype of a can-recycling machine was created. The picture below of the prototype links to Project 2’s website.
The method of sustaining aluminum on Penn State’s campus that our group is investigating revolves around the idea of recycling aluminum-based cans. To improve the sustainability of cans on campus, a rebate would be implemented on all cans sold on campus. This means that the prices of canned beverages on campus would slightly increase, but the rebate would allow the person recycling the cans to regain small bits of revenue on Penn State’s campus equivalent to before the implementation of this rebate program. The addition of this program would be an overall benefit for the consumer and Penn State’s campus. For the students that do not accept the rebate and throw away the cans as normal, rebate money is lost that goes directly to Penn State. The obvious incentives for students recycling the cans are the increase of recycling on campus and the opportunity to earn cash back for recycling.

Since this program is exclusive to Penn State’s campus, an option could exist in which revenue generated from can rebates could be converted into LionCash+ or even meal points for use in the dining commons. Implementation of this program could also extend to the town of State College.

Major aluminum supply chains include Alcoa, Vettenfall, Rusal Co., American Douglas Metals, Sierra, and Bonnell. All of these companies manufacture, distribute, and hold responsibility for the recycling of their goods. The process of recycling aluminum includes four stages: can-shredding, de-coating, melting, and casting. This process is normally done all by one company and they are able to re-manufacture the aluminum products using this process repeatedly. Aluminum is the most recycled material out there and with the implementation of this process on Penn State’s campus, we can strive to make aluminum more sustainable and eco-friendly.
Conceptual Option Matrix Results

Our team weighted five factors for each conceptual option. These five factors were human factors (likeliness of humans to use rebate program), innovation (originality of idea), quality of life (environment around program area), implementation (easiness to transition into), and economic viability (cost). The strongest-weighted factors were human factors, implementation, and economic viability. Innovation had a small weight, and quality of life has no weight. In our group's opinion, the quality of life of where the program is implemented does not matter.

Each teammate came up with a specific location to implement the program:

- Robert – Residence hall commons area
- Christopher – Bryce Jordan Center / Beaver Stadium
- Brian – The Hetzel-Union Building (HUB)
- Karl – Fitness centers (White building, IM building, Rec hall)
- Monish – Any random building

By ranking each location from one to five and by multiplying the number by its weight factor, the best option was chosen to be the residence halls. Weight totals are as follows:

- Residence halls – 3.6
- BJC / Beaver – 2
- HUB – 3.5
- Fitness centers – 2.2
- Random building – 2.6

While the residence halls won in weight, the HUB was very close. The only factor that made the HUB slightly lower in score compared to residence halls was human factors. People will be less likely to use the rebate program in the HUB compared to residence halls simply due to proximity.
Cans created at factory → Cans brought to PSU UP Campus (stores, etc.) → Students and faculty buy cans

Students and faculty ← Students and faculty return empty cans to HUB or closest residence hall commons area

Living off campus?

Students and Faculty return empty cans to local recycling center (possible locations TBD)

Cans counted at center, cash rebate per can given in form of LionCash+ or meal points → Cans return to recycling plant for reuse with beverages

Block Flow Diagram: Aluminum Can Rebate Program
Cans created at factory

Cans brought to PSU UP Campus (stores, etc.)

Students and Faculty purchase

Students and faculty consume

Students and faculty return empty cans to HUB or closest residence hall commons area

Living off campus? Students and Faculty return empty cans to local recycling center (possible locations TBD)

Cans counted at center, cash rebate per can given in form of LionCash+ or meal points

Counted cans Cans return to recycling plant for reuse with beverages

Trucks

Aluminum cans

Recycled aluminum

Aluminum Can Rebate Program
THE ECONOMICS OF RECYCLING

Team 8:
Robert Sill
Brian Roda
Christopher Lynch
Monish Srinivasan
Karl Tang
THE PROBLEMS WITH CURRENT RECYCLING HABITS

• AVAILABILITY OF CONTAINERS
• MINOR CONFUSION
• LAZINESS
• LACK OF INCENTIVE
RECYCLING FACTS

• According to the EPA, 50.7 percent of aluminum were recycled in 2009
• Tossing away an aluminum can wastes as much energy as pouring out half of that can’s volume of gasoline
• Every minute, an average of 113,204 aluminum cans are recycled
• An empty aluminum can is worth about one cent

IDEAS TO FIX RECYCLING PROBLEMS

- Increase number of bins?
- Recycling awareness programs?
- Develop an incentive?
OUR PROPOSED SOLUTION: CAN REBATES

- Development of Incentive
  - Removes laziness and an incentive factor
  - Easy to add locations
  - Confusion simplified
HOW IT WORKS

- Price of cans increases 15 cents
- Recycling stations implemented
- Recycling cans yields 15 cents back per can
LET’S THINK OF THE POSITIVES...

• **Rebate system has no gain or loss on purchases**
  • Overall, people like to earn something

• **15 cents = ideal price increase**
  • 15 cents high enough of an amount for people to care about recycling cans
  • Also high enough where it doesn’t affect price of cans too much
    • 15 cents per can on a 12-pack of cans yields a $1.80 price increase
      • Minor difference compared to its $4.99 face value

• **Price increase only implemented on PSU campus**
  • If cans aren’t recycled, extra $$$ goes to Penn State
PICKING A LOCATION...

BEAVER STADIUM / BJC

THE HUB

RESIDENCE HALLS

FITNESS CENTERS
PICKING A LOCATION...

- **Deciding factors:**
  - Human Factors
  - Innovation
  - Implementation
  - Economic Viability

- **Winner: Residence Halls**
PROTOTYPE OF CAN RECYCLING KIOSK
PROCESS FLOW DIAGRAM

Recycled aluminum
Cans created at factory

Trucks
Cans brought to PSU
UP Campus (stores, etc.)

Aluminum cans
Students and Faculty
purchase

Cans with beverages
Students and faculty consume

Empty cans
Students and faculty return empty cans to
HUB or closest residence hall commons area

Living off campus?

Empty cans
Students and Faculty return empty cans to
local recycling center
(possible locations TBD)

Can-counting machine
Cans counted at center, cash rebate per can given in form of LionCash+ or meal points

Counted cans
Cans return to recycling plant for reuse with beverages
IN CONCLUSION...

• **Overall win-win for both the consumer and PSU**
• **When people recycle, everybody wins**
• **If people don’t recycle, the university wins**
• **Together, with the implementation of this new system, we can make PSU a more sustainable campus**